B.D.H.
VITAMIN
PRODUCTS

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AVOLEUM

AVOLEUM

A highly-active standardised
solution of Vitamin A

THE BRITISH DRUG HOUSES LTD.
LONDON N.1

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AVOLEUM

A highly-active standardised solution of Vitamin A

B.D.H. Vitamin A products

The British Drug Houses are pioneers in the manufacture of concentrated vitamin preparations, and for many years past they have manufactured and issued two Vitamin A products—Radiostoleum and Radio-Malt; also they have been manufacturing Carotene B.D.H. for some time, and special literature in reference to this last-named product is available to any physician on application.

Relationship between Carotene and Vitamin A

Recent research on the relation of carotene to Vitamin A (Prof. P. Karrer, British Association for the Advancement of Science, 1931) has established the fact that carotene is not identical with the Vitamin A obtained from mammalian oils, although, when carotene is fed to animals, an accumulation of Vitamin A occurs in the liver of such animals (Prof. H. von Euler, British Association for the Advancement of Science, 1931). Furthermore, concentrates of Vitamin A of far greater biological activity than carotene have been obtained from animal oils. Investigation, therefore, confirms the view that Vitamin A is accumulated in mammalian livers, such accumulation arising as the result of the ingestion of carotene in the form of a constituent of grass or other vegetable product.

As mentioned on page 7 of this booklet a sample of pure crystalline carotene has been adopted as the

International Standard for Vitamin A. This sample is to be kept under specified conditions, and, if proved to be of satisfactory stability, it is suggested that it be adopted as the permanent standard for Vitamin A, and that the activity of all Vitamin A products be expressed in terms of this standard.

A natural source of Vitamin A

In the light of the foregoing it was evident that mammalian liver oil containing Vitamin A itself was likely to prove the most satisfactory source of this vitamin. The B.D.H. decided, therefore, to investigate the possibility of making a concentrated solution of Vitamin A from mammalian livers rather than to pursue further the subject of carotene. The result of this investigation has been the discovery of a process for making a highly-concentrated solution of Vitamin A from mammalian livers, which solution possesses a far greater activity than any preparation of this vitamin previously issued ; moreover it is supplied without the admixture of Vitamin D. This new preparation is available for use in medical practice under the name Avoleum.

Avoleum a natural product

Avoleum is a natural product in every sense of the word; no Vitamin D in the form of irradiated ergosterol (Radiostol) is added to it ; indeed it may be regarded as being free from Vitamin D.

Methods of standardisation of Avoleum

As in the case of all B.D.H. vitamin preparations, Avoleum is standardised in accordance with the most accurate known methods. The standardisation is effected by methods exactly similar to those employed in the standardisation of Radiostoleum ; that is to say, (1) By means of biological tests upon rats, by the observation of its effects in the promotion of growth and in the prevention of xerophthalmia, (2) By the

antimony trichloride test—a test based upon a previously-known reaction—originated and developed in the B.D.H. laboratories. According to this method, the blue colour given by 0.04 gram of the substance when mixed with the antimony trichloride reagent is accurately measured in a colorimeter; Avoleum gives a blue colour of the intensity known as 900 blue.

International Standard for Vitamin A

An International Standard for Vitamin A has been adopted recently by the Permanent Standards Commission of the Health Organisation of the League of Nations (Brit. Med. Journ., 1931, **2**, 862).

As soon as the sample of pure carotene, which is approved for purposes of comparison, becomes available the potency of Avoleum will be expressed in terms of this International Standard. The Vitamin A strength of Radiostoleum and Radio-Malt also will be measured by comparison with the standard sample of carotene which is to be prepared and kept under conditions specially defined by the Standards Commission.

USES

Avoleum not a substitute for Radiostoleum

Avoleum is not intended in any way to replace Radiostoleum. The British Drug Houses will continue to issue the latter product for use in those conditions in which both Vitamins A and D are required, and particularly in the prophylaxis of acute infections. Full information on the uses of Radiostoleum and on the conditions in which its anti-infective properties have been found to be of value in medical practice is published in a special booklet which can be obtained on request.

Vitamin A in Avoleum more active than in Radiostoleum

It is anticipated, nevertheless, that to some extent the use of Avoleum will supplement that of Radiostoleum. Being of greater Vitamin A activity than

Avoleum suitable for elderly patients

Radiostoleum, Avoleum is more suitable for use in the prophylaxis and treatment of bacterial infections when the administration of Vitamin A in massive doses is necessary. Further, as it contains no Vitamin D—the calcifying vitamin—Avoleum is more suitable than Radiostoleum for administration to elderly patients; indeed in all conditions where Vitamin D is contra-indicated Avoleum should be administered in preference to Radiostoleum. The latter product, however, is to be preferred, on account of its Vitamin D content, for administration to children and to pregnant and lactating women.

DOSAGE

AVOLEUM CAPSULES	**1 to 3 daily**
AVOLEUM LIQUID	**3 to 9 minims daily**

MODES OF ISSUE

CAPSULES (each containing 3 minims of the physiologically-standardised solution)

Tins of 50 .. .. per tin 5s.

LIQUID :

Bottles of 10 c.c. .. .. .. per bottle 3s. 6d.

Fuller information relating to conditions in which Vitamin A may be found of value are given in the publications which The British Drug Houses issue in reference to Radiostoleum and to Radio-Malt.

Av/3111/B1 *Printed in Great Britain*

RADIOSTOL

RADIOSTOL

A standardised solution of
Vitamin D

THE BRITISH DRUG HOUSES LTD.
LONDON N.1

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RADIOSTOL

A standardised solution of Vitamin D

History of Radiostol

Radiostol is the original British irradiated ergosterol; it was issued for medical use in February, 1927. It is an entirely British product; moreover, the research which led to the discovery that ergosterol, on irradiation, forms Vitamin D was carried out chiefly in Great Britain([1]).

Vitamin D produced by ultraviolet rays

Until Radiostol was made available for medical use, the population of the world depended for its requirements of Vitamin D upon the intake of the vitamin through the medium of food and upon the action of the sun's rays on the skin—the presence of minute traces of ergosterol in the skin of human beings and of animals making this natural method of production possible. The supply of Vitamin D, therefore, was often inadequate and always uncertain; hence the production of Radiostol by the action of ultraviolet light upon ergosterol, with the consequent availability of a supply of Vitamin D more than sufficient to cover all requirements, is of paramount importance in the maintenance of health, particularly in early life.

Since the introduction of Vitamin D into practical therapeutics in 1927, a considerable amount of research has been carried out, not only on its possibilities as a medicament but also on its chemistry.

Pure crystalline Vitamin D

In a recent report ([2]) it is stated that workers at the National Institute of Medical Research have succeeded in isolating Vitamin D in a state of absolute purity, the pure vitamin being given the name "Calciferol." It is a white substance of definite crystalline structure; on analysis it shows the same empirical formula as ergosterol.

The report is evidence of a great scientific advance, inasmuch as it is now possible to make Vitamin D in a crystalline form of unvarying purity and of a constant activity equivalent to forty million units per gram.

Calciferol for use in research

The British Drug Houses at once transferred the process for making Calciferol to the manufacturing scale, and they are now actually producing Vitamin D in a pure crystalline form; it is issued as a white crystalline substance for the use of research workers.

Radiostol for use in medicine

Radiostol, in the form of solution or pellets, is Vitamin D standardised and exhibited for use in medicine: In fact from the time of its first issue Radiostol has been manufactured under scientific control, and its Vitamin D activity has been maintained at a definite standard.

Method of standardisation

The unitage adopted for expressing the activity of Radiostol is that described by the Medical Research Council ([3]). Radiostol is standardised in terms of the standard preparation of irradiated ergosterol issued by the Medical Research Council which contains 1,000 units Vitamin D activity per c.c. This standard has been

adopted recently for international use by the Permanent Standards Commission of the Health Organisation of the League of Nations ([4]). Thus the potency of Radiostol is already expressed in terms of the International Standard. The tests are carried out on rats made rachitic by being fed on appropriate diet ; the criterion used is the deposition of calcium in the cartilage at the proximal end of the tibia and the distal ends of the radius and ulna (the ' line ' test).

Conformity with International Standard

The normal function of Vitamin D is to control calcium and phosphorus metabolism, and it is now established that correct calcium and phosphorus metabolism is possible only when the available Vitamin D is adequate ; any increase in the calcium and phosphorus intake has little effect upon the development of bones and teeth when there is a deficiency in the Vitamin D absorption.

Function of Vitamin D

The importance of including a sufficiency of Vitamin D in the diet of the young was emphasised in a lecture ([5]) in the following terms :—

Vitamin D necessary for skeletal development

> " Bones and milk teeth begin to be formed long before the infant is born, and their proper structure in the early stages depends on a sufficient supply of the necessary chemical substances from the mother. Both these tissues are composed largely of calcium phosphate, but however much calcium and phosphorus is available the bones and teeth are imperfectly formed unless there is an adequate supply of Vitamin D (the antirachitic or calcifying vitamin)."

Furthermore, it has been stated that " the mortality and morbidity of measles are the measure of the incidence of rickets." ([6]) ; although this may be putting the case a little strongly there is no doubt that measles and,

Measles associated with Vitamin D deficiency

possibly, whooping-cough, the two diseases "which have given us the most consistently high death rates, defying the control measures put into effect by the health departments" ([7]), are associated in some way with rickets. It would appear, therefore, that hitherto these problems have been attacked from the wrong angle, and that by preventive treatment with Radiostol much of the danger of measles—and probably of whooping-cough—can be overcome.

Sources of Vitamin D

Whilst supplies of most vitamins are usually obtainable from the daily diet of the everyday articles of food only milk, butter and eggs contain Vitamin D, and it is present in these only in very minute and variable quantities.

Thus for people living under modern conditions, also particularly for those who by reason of occupation or custom are compelled to spend a great proportion of their time indoors, and, in consequence, suffer from chronic sun-starvation, ample supplies of Vitamin D in the form of an extra-dietary product are essential for the maintenance of health.

USES

In rickets

Radiostol is recognised as a specific for rickets and for all those conditions which arise from an obvious deficiency of Vitamin D.

In general skeletal defects

The administration of Radiostol acts as a corrective of faulty calcium and phosphorus metabolism ; hence it is of particular value for the prevention and correction of all manner of skeletal defects in children.

It is prescribed also for adults suffering from osteomalacia, hunger osteopathy and certain idiopathic steatorrhœas ; moreover, it has proved of value for accelerating the healing of fractures.

For the prevention of dental caries

Particular attention has been directed recently to the influence of Vitamin D upon the normal development of teeth and the prevention of dental caries.

It was shown a few years ago by May Mellanby and Lee Pattison ([8]) that by supplementing the diet with regular doses of Radiostol, dental caries could be arrested.

These workers summarised the results of their investigation as follows :—

> " In a batch of 21 children whose average age was about 5½ years the addition of Vitamin D in the form of irradiated ergosterol (Radiostol) checked the initiation of new carious points, diminished the spread of old carious points and arrested the infective process in many carious teeth."

The publication by the Medical Research Council of an official interim report entitled " The Influence of Diet on Caries in Children's Teeth " ([9]) serves to emphasise the importance of the subject. The report demonstrates the possibility of controlling the onset and spread of dental caries in children by the daily administration of standardised amounts of Vitamin D in the form of Radiostol. The results are likely to be of far-reaching effect, as is indicated by the following extract from the preface to the report :

> " It appears to the Council that the publication of an interim Report at this stage is wholly justified by the urgency attending this subject. It is already evident that the successful research work that has been accomplished in this field points to immediate and widespread measures of preventive control."

It is a striking testimony to its efficiency and to its uniform activity that Radiostol was the particular source of Vitamin D employed throughout these experiments.

In pregnancy

As a result of another important piece of work ([10]), it has been established not only that an adequate supply of Vitamin D is essential for the proper formation of sound teeth and for the prevention of dental decay, but that an insufficiency of this vitamin in the maternal diet affects also the future structure of the permanent teeth in the offspring.

ADMINISTRATION

Radiostol Solution is usually given to children, but adults generally find the pellets more convenient ; the solution is easily taken in a teaspoon, on a lump of sugar or in milk, the last method being the most suitable for infants.

DOSAGE

In prophylaxis

RADIOSTOL SOLUTION—For the prevention of rickets in children, and for the prevention of dental caries and as a general prophylactic

Infants under 3 months	**3 drops twice daily**
Infants under 6 months	**3 drops three times daily**
Children over 6 months	**5 drops three times daily**

RADIOSTOL PELLETS—**One pellet eaten with or after a meal twice daily**

In treatment

RADIOSTOL SOLUTION—For the treatment of rickets, tetany, spasmophilia, wasting-disease and other conditions arising from Vitamin D deficiency

10 drops three times daily

RADIOSTOL SOLUTION (for external application to burns)

Dilute with two parts of liquid paraffin

MODES OF ISSUE

SOLUTION (for oral administration)

Bottles of	25 c.c.	per bottle	2s. 6d.
,,	100 c.c.	,,	8s. 6d.
,,	500 c.c.	,,	27s. 0d.

PELLETS

Tins of 25	. . . . .	per tin	2s. 6d.
Bottles of 50	. . . . .	per bottle	4s. 6d.

SOLUTION (in liquid paraffin for external application)

Bottles of	25 c.c.	per bottle	2s. 6d.
,,	100 c.c.	,,	8s. 6d.
,,	500 c.c.	,,	27s. 0d.

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RADIOSTOLEUM

RADIOSTOLEUM

A standardised solution of
Vitamins A and D

THE BRITISH DRUG HOUSES LTD.
LONDON N.1

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RADIOSTOLEUM

A standardised solution of Vitamins A and D

Radiostoleum is a highly-active, standardised solution of Vitamins A and D.

An accurately standardised product

It is standardised as to its Vitamin A content by means of the antimony trichloride test of Carr and Price ([1]), supplemented by (a) biological tests in which the criterion used is the power necessary to cure or prevent the onset of infection in rats, and by (b) growth-promoting tests on rats, the criterion being the power necessary to stimulate or to maintain their growth when they are fed on a diet deficient in this vitamin.

Vitamin A standardisation

Radiostoleum is standardised as to its Vitamin D content by the same method as that employed for the standardisation of Radiostol; young rats are given a rachitogenic diet; the activity of Radiostol in producing healing of rickets is compared with that of the standard preparation of irradiated ergosterol, issued by the Medical Research Council, which contains 1,000 units of Vitamin D per c.c.([2]). The criterion used is the deposition of calcium in the cartilage at the distal ends of the radius and ulna and at the proximal end of the tibia (the 'line' test).

Vitamin D standardisation

International Standardisation of vitamins

As a result of the Conference on Vitamin Standards which was held in London in June, 1931, certain recommendations concerning International Standards and Units have been adopted by the Permanent Standards Commission of the Health Organisation of the League of Nations ([3]).

Vitamin D in accordance with International Standards

Among the standards agreed upon provisionally are those defined for Vitamins A and D. For Vitamin D the continuation of the use of the existing standard material afore-mentioned is approved. For the standardisation of Vitamin A it is suggested that, as a temporary measure, a standard sample of pure carotene be prepared and kept under specified conditions—this standard to become permanent if its stability prove to be satisfactory. As soon as the standard becomes available The British Drug Houses will be able to express in terms of the International Standard the Vitamin A unitage of all three B.D.H. Vitamin Products—Radiostoleum, Avoleum and Radio-Malt—all of which contain measured amounts of Vitamin A.

International Standard for Vitamin A to be adopted

Stability of Radiostoleum

Radiostoleum is a perfectly stable preparation, the activities of both vitamins contained in it remaining constant under normal conditions of storage; moreover, the maximum vitamin activity of Radiostoleum is maintained in all conditions of climate as long as it is stored away from bright light.

Combined action of Vitamin A and Vitamin D

Radiostoleum promotes healthy growth and correct calcium and phosphorus metabolism; furthermore, it finds another extremely important use in the prevention and treatment of acute infections by virtue of its power to build up a line of defence against invading organisms through the agency of its content of Vitamins A and D.

It is worthy of note that the association of Vitamins A and D is of advantage owing to the fact that these vitamins generally give more satisfactory results when administered together than when administered singly in the treatment of the specific infections for which they are usually prescribed ([4]).

Experimental evidence of anti-infective action of Vitamin A

It has been observed repeatedly that deaths among animals fed on diets deficient in Vitamin A show an abnormally high proportion due to diseases of the respiratory tract. In this connection a recent report on the results of some important feeding experiments is of interest. It is stated in the report ([5]) that animals receiving a diet rich in vitamins are maintained in perfect health whilst others from the same stock living under exactly similar conditions, except for the fact that their diet is deficient in Vitamin A, develop infections such as pneumonia and pleurisy; other conditions such as sinusitis, otitis media, adenoids, gastro-duodenal ulcer and urinary calculus are also prevalent. When death ensues it appears always to be accompanied by widespread bacterial infection; conversely, if the supply of Vitamin A is re-established before the infection has become too much advanced the animal may be restored to health.

Results of deficiency of Vitamin A

From the results of these experiments it is concluded that the maintenance of resistance to infective disease is brought about by the ingestion of Vitamin A, and that an adequate supply of Vitamin A in the diet provides the epithelial lining-tissues of the upper and lower respiratory passages, the ear, the intestinal tract etc. with the necessary power to maintain a condition of invulnerability against attacks of bacteria. As soon as

Breakdown of resistance due to Vitamin A deficiency

Vitamin A is lacking, however, a deterioration commences, keratinisation takes place, and the first line of the body's defence—the epithelial tissue—breaks down completely. There is, however, still to be overcome the resistance offered by Vitamin D through its anti-infective action on the blood ; for it is generally recognised that Vitamin D maintains the correct calcium and phosphorus balance in the blood, and exerts a definite bactericidal action throughout its course. Vitamin D deficiency usually occurs simultaneously with Vitamin A deficiency, as these vitamins are often associated in nature ; thus a general breakdown of resistance to bacterial infection is the natural consequence of a Vitamin A deficiency in the diet.

Pyorrhœa alveolaris due to Vitamin A deficiency

The results of other investigations (Medical Research Council Interim Report, 1931, 'The Influence of Diet on Caries in Children's Teeth') demonstrate that pyorrhœa alveolaris, which has serious ill-effects on the development of teeth and their maintenance in a healthy condition, is caused by a deficiency of Vitamin A.

USES

The administration of Radiostoleum, with its scientifically-standardised content of Vitamins A and D, offers the best means of ensuring adequate supplies of these vitamins to the human subject.

In puerperal septicæmia

The value of Vitamin A in pregnancy was demonstrated by experiments carried out by Mellanby and Green in 1929 at the Jessop Maternity Hospital, Sheffield ([6]) ; using Radiostoleum as their source of Vitamin A these workers established beyond a doubt that Vitamin A, when administered in massive doses to patients suffering from puerperal septicæmia, produced pronounced curative effects.

In pregnancy

A still more recent investigation at the same hospital ([7]) ([8]) has been made with a view to the confirmation, or the repudiation, of the deduction that

> " if Vitamin A had even a slight therapeutic effect in such a virulent infection as septicæmia it should be of much greater value as a prophylactic agent."

As was the case in the first investigation, in this second series also Radiostoleum was employed; it was administered to 275 pregnant women, 275 being kept as controls. The results were classified on the basis of the B.M.A. standard of puerperal morbidity—that is, all cases are classified as morbid which show

> " two rises of temperature to 100° F. or over between the end of the first and the end of the eighth day after delivery."

In the group treated with Radiostoleum there were

> " only three morbid cases on this standard, an incidence of 1.09 per cent. In the control group there were 13 morbid cases, an incidence of 4.73 per cent.—a rate of over four times as high. . . ."

Such results translated into the terms of the annual morbidity rate in England and Wales would mean roughly a reduction from 28,000 to 6,000 cases on the basis of 600,000 births per annum.

The above investigation affords confirmatory evidence of the use of Radiostoleum as a routine prophylactic for administration to expectant mothers during the last three months of pregnancy; the Vitamin A in Radiostoleum builds up resistance to withstand attacks of infection at birth; the Vitamin D, besides maintaining correct calcium metabolism in the mother, lays the foundation for the development of a correct skeletal frame and well-calcified teeth in the child([9]). In fact, the beneficial effect on the child of the administration of Vitamin D to the pregnant mother is obvious

Prolonged beneficial effect of Radiostoleum

when it is considered that, according to experimental observations ([10]), "a pregnant animal fed with anti-rachitic substances would produce young upon which the most extreme rachitic diet would have no effect," the fœtus having received a sufficient amount of protective factor from the mother to satisfy the needs even under the most unfavourable environmental conditions.

In general infective conditions

There is also much accumulated evidence which tends to show that those whose daily diet is rich in Vitamin A or who, particularly during the winter months, add an extra-dietary product known to be rich in Vitamin A to their normal diet, are able to maintain a resistance to common infections such as colds and inflammatory diseases of the nose and the middle ear. In consequence, Radiostoleum is now being widely prescribed not only in the prophylaxis and treatment of puerperal septicæmia but also of many acute infections of the respiratory passages, quite apart from its being used to promote healthy growth and to ensure correct phosphorus and calcium metabolism.

In view of the fact that conditions as diverse as adenoids and stone in the bladder have developed in animals fed on an ill-balanced diet deficient in Vitamin A it is not surprising that Radiostoleum should have proved of value to general practitioners in the treatment of such conditions as pleurisy, pulmonary tuberculosis, septic pneumonia, osteitis deformans, rheumatoid arthritis, scarlet fever, measles and Graves's disease. Mellanby ([11]) has shown, also, that Vitamin A exerts a protective action against certain toxins which affect the nervous system ; hence Radiostoleum may be employed with advantage in the treatment of subacute combined degeneration of the spinal cord.

Uses of Radiostoleum in general practice

Radiostoleum has a wide use, therefore, in general routine practice. There is no condition in which it is contra-indicated, and it may be administered with equal benefit to patients of all ages—except perhaps for certain aged people—as a safeguard against infection.

The following are a few of the numerous occasions and conditions in which Radiostoleum is found to be of real value in the ordinary routine of general practice :—

In the autumn and winter

The administration of Radiostoleum during the autumn serves to prevent the onset during the winter months of colds and other ailments ; it is of value in preventing dangerous sequelæ in pneumonia and in febrile conditions such as scarlet fever.

In childhood

Radiostoleum is administered with advantage to all growing children to ensure healthy growth and correct development of bones and teeth ([12]), and to act as a safeguard against the common diseases of childhood.

In convalescence

After illness when resistance is low, Radiostoleum administration produces a valuable restorative effect.

In adolescence and at the menopause

During the physiological disturbances of youth and middle age Radiostoleum helps to adjust the balance, and thus to maintain the normal body metabolism.

Avoleum preferable for the elderly

It is worthy of note that Vitamin A is now available in the form of Avoleum which product may be regarded as being free from Vitamin D ; Radiostoleum, therefore, is not administered to patients who have passed middle life except in those cases in which a deficiency of Vitamin D as well as of Vitamin A is evident.

That the value of Radiostoleum, with its accurately-standardised content of Vitamins A and D, is now

generally recognised is confirmed by the presidential address on "Public Health—To-day and To-morrow" delivered at the Annual Meeting of the British Medical Association at Eastbourne, July, 1931 ([13]), in which after directing attention to the experimental findings (loq. cit.) by Professor Edward Mellanby, Mrs. May Mellanby and others, the president emphasised

> "the necessity of the application of such discoveries by those whose duty it should be to look after the health of the persons concerned. A thorough application to the population . . . would result in a very large reduction in the suffering of children and in the subsequent defects of adults. It would be preventive medicine in its best form, incomparably better than treating these ailments in clinics."

ADMINISTRATION

For administration to children in prophylaxis and treatment Radiostoleum in liquid form is employed; as a prophylactic for adults the capsules are more suitable, but when larger doses are required, as in the treatment of acute infections, the liquid should be prescribed.

DOSAGE

The dosage of Radiostoleum varies according to the age and condition of the patient. For infants it ranges from six to nine drops daily, whilst the dose for patients suffering from puerperal septicæmia is often as much as 4 fluid drachms (16 c.c.) daily.

The tables of dosage here given are based upon work carried out in the B.D.H. physiological laboratories, where it has been found that rats require for the prevention of xerophthalmia and the maintenance of normal growth 0.0013 c.c. of Radiostoleum daily; for the cure of xerophthalmia and the stimulation of growth they require 0.005 c.c. of Radiostoleum daily. These doses represent, on the weight for weight basis, for a

100 g. rat and a 70 kg. man, 1 c.c. of Radiostoleum daily as a prophylactic dose and 3.5 c.c. daily as a curative dose ; but as these observations are based on the fact that the rats under experimental conditions receive no other source of Vitamin A—whereas most human beings are taking small quantities in the ordinary food—2 c.c. daily of Radiostoleum is recommended as a minimum curative dose. Mellanby and Green ([6]), however, used as much as 8 c.c. of Radiostoleum twice daily in the treatment of acute cases of septicæmia.

RADIOSTOLEUM LIQUID

For infants

To prevent rickets, to ensure healthy growth and to build up resistance to withstand the attacks of prevailing epidemics — **6 to 9 drops daily** — **In prophylaxis**

For growing children

To ensure healthy growth, to safeguard against minor skeletal defects, to prevent dental caries and to build up resistance against acute infections — **15 drops daily**

For adults

As a tonic for building up the depleted reserves in run-down conditions and as a safeguard against infection — **15 drops daily**

For expectant mothers

To build up resistance during the last three months of pregnancy — **15 drops daily**

RADIOSTOLEUM CAPSULES — 1 to 3 daily

RADIOSTOLEUM LIQUID

In puerperal septicæmia	**8 c.c. (2 fl. drachm) daily**	**In treatment**
In acute conditions generally	**2 c.c. (½ fl. drachm) daily**	

NOTE

There is no doubt that in certain conditions of inadequate dietary, during illness, or when dried or unscientifically-prepared food is consumed, as well as in certain cases of unbalanced food intake, there is need for larger amounts of Radiostoleum than those indicated above ; such increased doses may be given with absolute safety.

MODES OF ISSUE

LIQUID

Bottles of 25 c.c.	per bottle	2s. 6d.
Bottles of 100 c.c.	per bottle	9s. 6d.
Bottles of 500 c.c.	per bottle	31s. 6d.

CAPSULES (each containing the equivalent of 6 minims of the standardised liquid)

Tins of 50	per tin	4s. 6d.

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Printed in Great Britain

RADIO - MALT

The Vitamin Malt Food
containing standardised
amounts of
Vitamins A B_1 B_2 and D

THE BRITISH DRUG HOUSES LTD.
LONDON N.1

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RADIO - MALT

The Vitamin Malt Food containing standardised amounts of Vitamins A B_1 B_2 and D

Composition—Vitamins A B_1 B_2 and D

Radio-Malt is a palatable combination of Radiostoleum (Vitamins A and D) with measured concentrates of Vitamins B_1 and B_2 : in other words, it contains, in scientifically-balanced proportions, the indispensable Vitamins A, B_1, B_2 and D—those particular vitamins which are not adequately available, especially during winter time, through the medium of the ordinary dietary. The B.D.H. have, by most careful study, arrived at methods of exhibiting the vitamins in such a way that they remain stable, with the result that Radio-Malt retains its full activity even after long storage ; hence, it provides the physician with a simple medium for the daily administration of the requisite amount of all those essential vitamins which are often lacking in the normal diets of their patients.

Stability proven

Vitamin C not a constituent of Radio-Malt

Radio-Malt contains no Vitamin C because it has been recognised by the B.D.H. from the time Radio-Malt was first issued that the incorporation of Vitamin C in an extra-dietary product of this nature is neither practicable nor especially desirable.

Unstable nature of Vitamin C

Its inclusion is not practicable because, when separated from the foods in which it occurs naturally, Vitamin C is the least stable of all the vitamins, and there are no known methods by which concentrates that retain their activity can be prepared. On the

other hand, fruits such as the orange, the lemon and the apple retain their Vitamin C well.

Vitamin C available in fresh fruit

Furthermore, a supplementary source of Vitamin C is unnecessary, as ample supplies may be derived from the juice of fresh fruit. Oranges, lemons and grape-fruit are particularly rich in this vitamin, and they are readily available in almost every part of the world.

Standardisation of vitamin content

The vitamin content of Radio-Malt is controlled by nutrition tests carried out in the B.D.H. physiological laboratories, young rats being used as the experimental animals. The tests include observations on the growth rate, as well as on the cure, or the prevention, of the specific diseases which develop in the rats when the diet supplied is deficient in the vitamin under test. Vitamin A and Vitamin D in Radio-Malt are standardised by the methods described under Radiostoleum.

Vitamin A

Two criteria are used in the assay of Vitamin A : the maintenance, or the resumption, of normal growth and the development, or the cure, of the eye disease known as xerophthalmia. In addition, the activity is standardised to a definite blue colour by the antimony trichloride test of Carr and Price ([1]).

Vitamin D

The Vitamin D potency is expressed in terms of the standard solution of irradiated ergosterol issued by the Medical Research Council which contains 1,000 units of Vitamin D per c.c. ([2])—a standard which has now been adopted by the Permanent Standards Commission of the Health Organisation of the League of Nations ([3]). Young rats are made rachitic by being fed on a deficient diet : the activity of Radio-Malt in curing the rickets is

compared with that of the standard, the deposition of calcium in the cartilage at the distal ends of the radius and ulna and at the proximal end of the tibia being the criterion used. The test is known as the " line " test.

Vitamins B_1 and B_2

Vitamins B_1 and B_2 are standardised by growth tests, and by other tests involving the prevention of rat polyneuritis and rat pellagra, when animals given Radio-Malt are compared with others on the same diet without this supplement.

International Standardisation

The Conference on Vitamin Standards, which submitted a report to the Commission referred to on the previous page, recommended the use of a sample of pure carotene —to be made and kept under given conditions—as an International Standard for Vitamin A activity ([3]). As soon as such a preparation becomes available it will be possible to express the activity of the Vitamin A contained in Avoleum, Radiostoleum, and Radio-Malt in terms of this International Standard.

The Vitamin D activity of the B.D.H. Vitamin Products containing this vitamin (including Radio-Malt) is already measured against the standard set for international use.

Deleterious effects of vitamin deficiency

The effects of a diet deficient in Vitamins A and D upon health are fully described in the booklet on Radiostoleum, which booklet will be supplied to any member of the medical profession on request.

Anti-infective action of Vitamin A and Vitamin D

Radiostoleum, a constituent of Radio-Malt, is a highly concentrated preparation of Vitamins A and D, employed, curatively and prophylactically, in routine practice as an anti-infective agent. It was used by Mellanby and Green ([4]), in their original experiments at the Jessop Maternity Hospital, Sheffield, in the treat-

ment of puerperal septicæmia, and it has since found wide usefulness in the treatment of numerous infective conditions. There is good reason to suppose that its action is due to its power, through its Vitamin A content, to maintain the epithelial lining-tissues of the body in a state of health, thus enabling them to resist the entrance of bacteria.

Vitamin A action on nervous tissues

Mellanby ([5]) has also adduced evidence that Vitamin A plays a rôle in the maintenance of the normal structure of the nervous tissues, and that it can prevent the deleterious effects of various toxic agents upon them.

Important rôle of Vitamin B in anæmia

Vitamin B, also, in addition to playing a part in the prevention of beri-beri and pellagra, exerts an influence on the onset of other diseases ; for example, evidence has recently been cited ([6])([7]) to show that this vitamin plays an important part in the prevention of pernicious anæmia ; indeed, it would appear that for the successful treatment of anæmia with liver or with preparations of liver, the presence of Vitamin B is essential ; Vitamin B also stimulates the appetite, and is of value as a general tonic.

Thus there is manifestly a close relationship between the incidence of disease and a deficiency of any of the three Vitamins A, B and D.

Necessity for balanced amounts of all vitamins

It has been shown by animal experiment that in order to ensure normal growth and to maintain perfect health it is not sufficient merely to provide ample supplies of Vitamins A and D regardless of the amount of Vitamin B ingested ; the proper balance between the vitamins and their unity of action is of importance, and must be taken into account. For example, the administration of large doses of Vitamins A and D involves an increased

demand upon Vitamin B, and a normally adequate supply of this vitamin, when Vitamins A and D are deficient, becomes distinctly inadequate when the intake of these two latter vitamins is increased.

In view of the foregoing, the advantages to be gained from the administration of Radio-Malt, containing as it does Vitamins A, B_1, B_2 and D in properly-balanced proportions, are obvious.

Food value of malt

Further, Radio-Malt has considerable food value by reason of its content of malt extract; moreover, it forms an excellent medium also for the administration of a carbohydrate, viz., maltose.

USES

As a general prophylactic and family tonic

Whilst Radiostol (Vitamin D), Avoleum (Vitamin A) and Radiostoleum (Vitamins A and D) find their principal uses in the prevention and treatment of rickets and in the prevention and treatment of specific infections, Radio-Malt, on account of its power to counteract the effects of a vitamin-deficient diet and the consequent general susceptibility to disease due to malnutrition, is more suitable for use as a general prophylactic and family tonic.

Radio-Malt finds an important place in preventive medicine; also it possesses value in hastening recuperation after illness; its use is not restricted to any particular age or sex, and for this reason it has a wide application in general practice.

During pregnancy and lactation

Radio-Malt is prescribed for pregnant and lactating women in order to provide a sufficiency of Vitamins A and D to enable the mother to withstand infection during labour and to maintain correct phosphorus and

calcium metabolism so that the bones of the fœtus and of the child become normally calcified. Radio-Malt also tends to prevent the development of anæmia ; further, it checks constipation and the uncontrollable vomiting of pregnancy and, generally, enables the mother to maintain a sufficiency of reserves during the time of extra demand.

During infancy and childhood — The regular ingestion of Radio-Malt during infancy and childhood ensures correct calcium and phosphorus metabolism, a normal skeletal frame with sound bones and teeth being the natural sequel.

At puberty and the menopause — Radio-Malt administration at puberty and the menopause helps to maintain the correct normal balance at such times of physiological derangement.

In old age — Radio-Malt may be given to the aged in order to raise the resistance against infections of the respiratory tract.

During convalescence — Radio-Malt administration also is of value after illness, as it replenishes the depleted reserves and restores the normal body metabolism.

General — Radio-Malt has probably achieved the greatest success, however, as a prophylactic for building up resistance against infections of all kinds, particularly those which enter the body through the epithelial lining of the respiratory passages, as, for example, the common cold and influenza. It is of great value in this respect to those who are compelled to go where these types of infection are prevalent, as in schools, offices and wherever there are congregations of human beings. This is particularly important during the winter months when, owing to lack of sunshine and to dietary deficiencies, the tendency to infection is highest.

DOSAGE

For infants and children

up to 3 years .. half to one teaspoonful twice a day

For children

over 3 years .. one to two teaspoonfuls twice a day

For adults .. .. one to two dessertspoonfuls twice a day

NOTE

In many cases it is desirable that these doses should be considerably increased ; this may be done up to ten times the amount with absolute safety.

MODES OF ISSUE

GLASS JARS

Approximately 1 lb.	per jar 2/-
Approximately 2 lb.	per jar 3/6
Approximately 4 lb.	per jar 6/6

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